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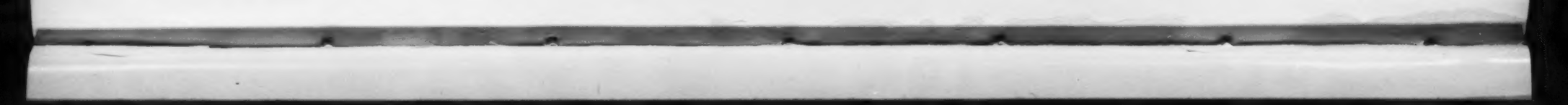

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SAN FRANCISCO'S PATH OF GOLD

San Francisco celebrated its advent as having the best illuminated street in America as its main artery by means of a great pageant on the night of October 4th. Then, for the first time, the new system of luminous arc lamps on ornamental standards showed the archcitectural beauty of Market street by night. daily press as the following extract from the Chronicle:

"A warm white light, the most brilliant that ever shone through a city thoroughfare after the sun had gone down, flooded the canyon of Market street from the Ferry to Seventh street. In this high tide of light the stars disappeared, the facades of buildings, never

Market Street, San Francisco, as the Path of Gold.

The accompanying pictures give a faint idea of the effect obtained.

As the full details of the lighting methods employed and of the floats participating in the parade were published in this journal of September 9, 1916, there is but little more to add. The illumination and electrical pageant were witnessed by the largest crowds that ever assembled on the streets of the city at night, and on every side were expressions of satisfaction and delight concerning its appearance. These may be typified as descriptions of the effect from the really seen before, stood out sharp against the night above. The banners waving midway in the night breeze glowed with color as though they had become luminous. On the sidewalks and the pavements light flowed everywhere, touched and enveloped everything, became all-pervading, as though it was rather a quality of the atmosphere than an illumination proceeding from any fixed source.

"Such was the wizardry of this marvelous light. It filled the street completely. It flowed into every space, as though it were a fluid standing in the trough of

Floats Illustrating the Evolution of Light.

Market street. In comparison with the brilliant illumination on Market street, every other street intersecting it seemed but a byway leading into darkness."

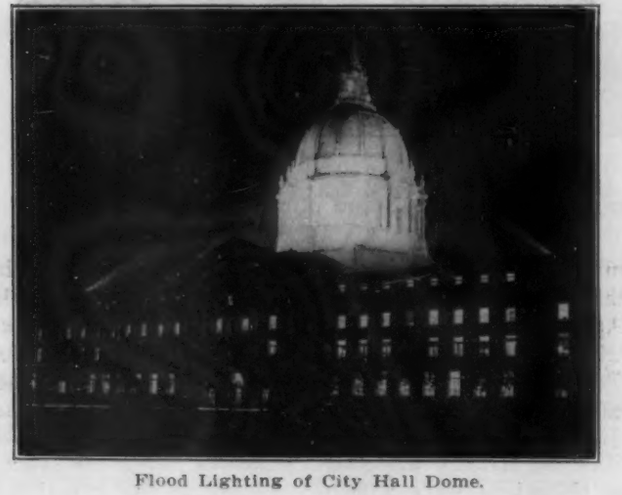
The Examiner characteried the illuminated thoroughfare as a "fairy street." "Out of the night flashed a new brilliance. The magic lamp of Aladdin became multiplied ten thousand fold. His wishing carpet lay the length of market street from the place where the ships come in to within a stone's throw of another realized vision, the Civic Center."

The warmest encomiums were showered upon W. D'A. Ryan, the illuminating engineer who wrought the wizardry.

The pageant was in three divisions. It was headed by various civic, military and fraternal organizations. Then came the electrical section, and lastly came the wonderful street car floats symbolizing the progress of man as represented by the evolution of lighting through the ages.

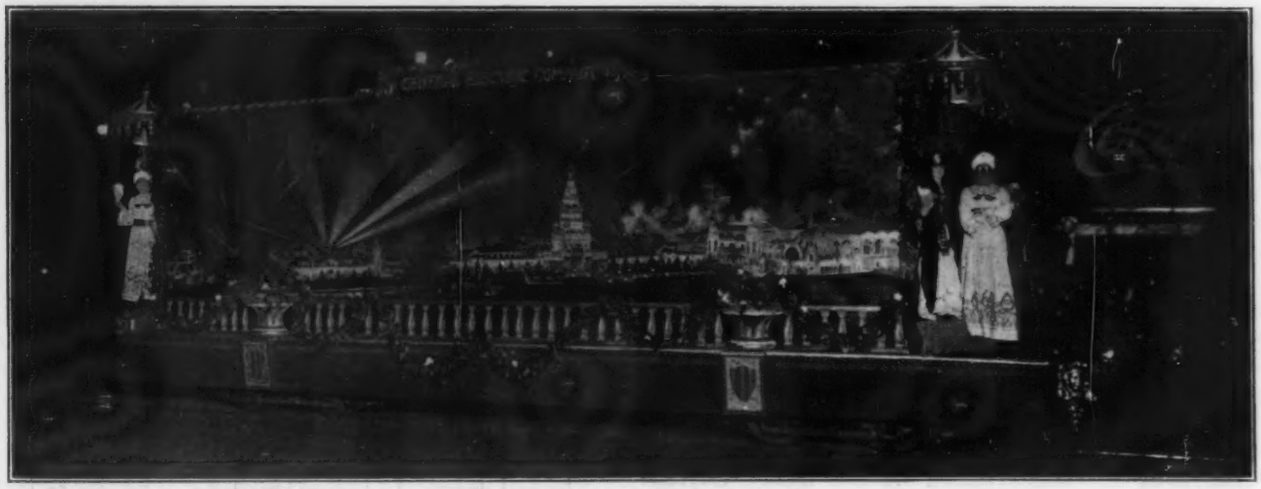
The first float in the electrical division, of which T. E. Collins and E. A. Wilcox were marshals, was that of the Electrical Development and Jovian League. It consisted of an animated replica of the "Modern Aladdin" poster mounted on an electric truck, which hauled a great smoking volcano on which appeared the Jovian team in costume.

The Aladdin poster was brought to life by a lad



Flood Lighting of City Hall Dome.

Electrical Development and Jovian League Float.



Float Showing Exposition by Night.

in Oriental costume and a great 18-foot genie. Electric lighted transparencies on either side carried the message "America's Electrical Week, Dec. 2-9, 1916. Do It Electrically." Aladdin was a Chinese boy. The genie was made of board, cut in silhouette and painted in colors. Current for the lamps was obtained from the truck's batteries.

The volcano was 24 ft. long, 8 ft. wide and 12 ft. at the highest point. On it the Jovians disported themselves with red and green fire and blazing torches. Under the direction of Tribune Murray Orrick were the following characters:

Jupiter	A. E. Drendell	Mars	H. E. Bittman
Neptune	H. P. Treat	Hercules	W. C. Wurfell
Vulcan	Horace Case	Apollo	Wm. Neelands
Pluto	George Gray	Mercury	A. J. Calloway

Particular credit is due to the Western Electric men for their hearty co-operation in the plan, half of the team coming from the one company.

Other floats in the electrical section included those of the American Ever Ready Company, the Novelty Electric Sign Company's electric flag and the "Cat's Paw" illuminated float.

The most elaborate floats were those in the last division showing the lights of all ages. These included "The Cave Man," with burning pine knot; "Assyrian," with torch and clay lamp; "Egyptian," with lamp and brazier; "Grecian," with decorated bronze lamp; "Roman," with candelabra; "Middle Ages," with candle, lantern and braziers; "Italian Renaissance," with festooned oil cups; "Eighteenth Century French," with hand lanterns and wall brackets; "Period of 1850," with early gas fixture; "Period of 1870," with oil lamp and calcium lamp; "Athena of the Heavens," Goddess of Light, representing the arc; "Mazda," the God of Light, representing the incandescent; "Modern Electric Lighting," "The Exposition by Night."

The Ferry tower was specially lighted in colored outline and the City Hall dome was illuminated by flood lighting as shown in illustration herewith.

On Thursday evening, October 5th, the festivities were concluded with a masque ball in the Exposition Auditorium, which was decorated in accordance with designs furnished by Mr. Ryan. Dahlias and chrysanthemums, in tall vases, on the pillars that rose from the boxes, formed a garden wall about the variegated hues of the dance floors, and each cluster of flowers bloomed in its own bright ray of light, while in the center of the hall arose a tower of flowers, lighted by the scintillators from the gallery.

Throughout the evening special effects were staged on the floor, chief of which was the Pageant of Light, in which 300 young men and young women in beautiful and effective garb represented the evolution of illumination, from the cave man, with his flickering torch, through the advance of Greece and Rome, the Middle Ages and Renaissance to the modern days of electricity, and the final success of outdoor lighting in the Path of Gold on Market street, the permanent and tangible relic of the wonderful illumination of the Panama-Pacific International Exposition.

A Typical Path of Gold Standard.

SOME ELECTRIC WATER-HEATING PROBLEMS SOLVED.

BY A. J. KERCHER.

Every engineer and physicist, who has investigated electrical service as applied to heating water, is conversant with its limitations, the most important of which, from the standpoint of the consumer, is the cost of service and from the central station standpoint, the load and diversity factors encountered.

The quantity of heat necessary to increase the temperature of a unit of water to any predetermined point is always the same, and the efficiency of water heating apparatus depends entirely on the percentage of heat transferred from a resistor to the water. The efficiency of water heating service, however, introduces the problem, not only of an efficient heating device, but the conservation of the heat. Current demand and diversity factor also enter into the problem and in many cases determine the rate for service. The maximum water demand is all important and in the case of domestic service, is usually on a weekly cycle.

In numerous instances it has been demonstrated that hot water service can be furnished by electricity in apparatus designed for a low current demand and high service efficiency cheaper than by other methods.

It is well known that the electric light and electric motor superseded the use of oil or gas in the first instance, and gas or steam power in the other, because the service either cost less or was better. The same reasoning applies to electric water heating.

A large number of office buildings and residences built a few years ago are without hot water service. These building are of Class A, or modern construction and yet without the modern system of electric ducts for power service. Today hot water is considered an essential service in any first class office building or home.

To meet the requirements of these conditions which call for apparatus justifying a low rate for service, with a small minimum charge and without added expense of extra wiring, special water heating apparatus has been designed. It can be built in sizes to suit the maximum demand for hot water while the current demand depending on the water demand and size of storage tank is very low.

Description and Test.

A standard lavatory water heater as shown in Fig. 1, designed to be placed either above the bowl or below it, is constructed as follows:

A cylinder with hemispherical heads welded into each end (1) is completely surrounded by thermal insulating material (2) which is protected by a polished metal case (3); the heating element (4) is clamped around a groove rolled into the copper tank. A cylinder (5) is suspended in the position illustrated to provide a restricted circulation of water so that hot water will be available sooner at the top of the tank. The hot water pipe (6) is returned to the lower level of the tank in order to prevent loss of heat by convection during the time when water is not being used. The cold water inlet (7) is placed in the bottom head and water is admitted directly over the pressure cell (8) which opens the switch contacts (9) when the

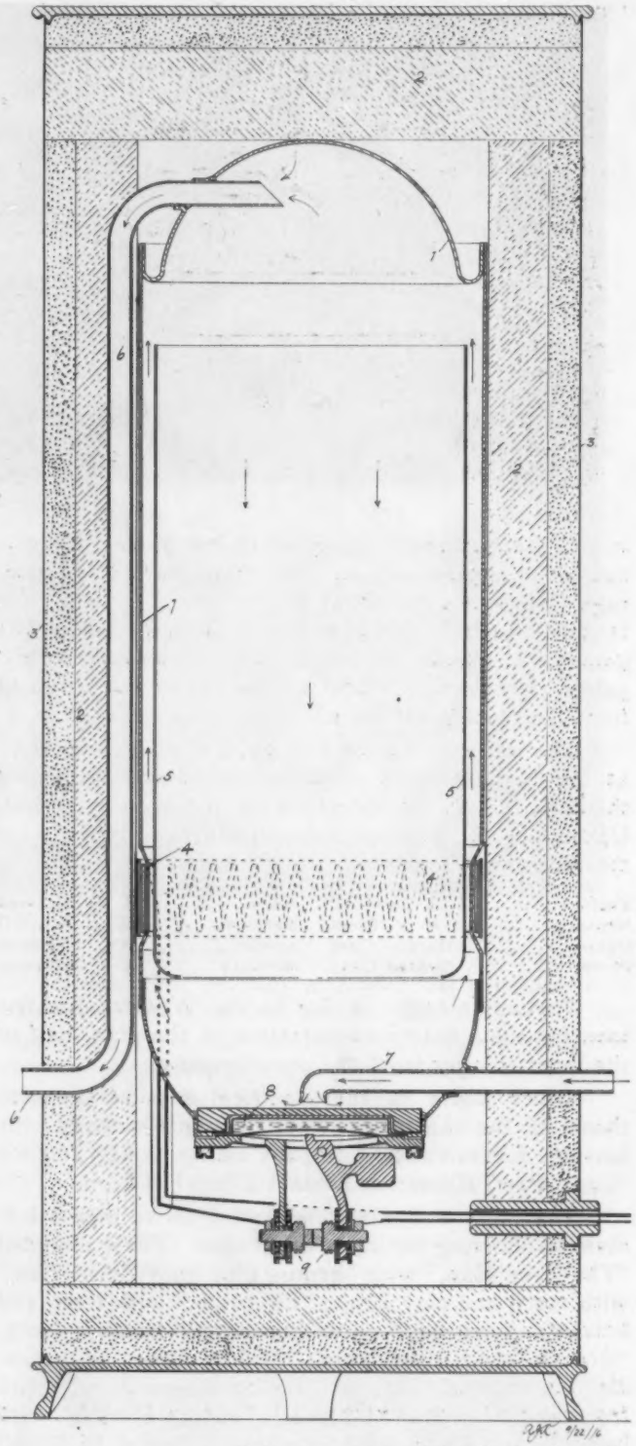


Fig. 1. An Automatic Lavatory Type of Water Heater.

temperature of the water reaches a predetermined point. Should any water be drawn from the tank, cold water will immediately cause the switch to close.

A test of the above heater which shows the practicability of electric water heating in a large office is as follows:

A 2 gal. 600 watt standard lavatory heater was installed with a water meter in the cold water supply pipe. A watt hour meter and a recording ammeter were used to measure the current input.

No restrictions were placed on the use of hot water, which was used only during the usual office

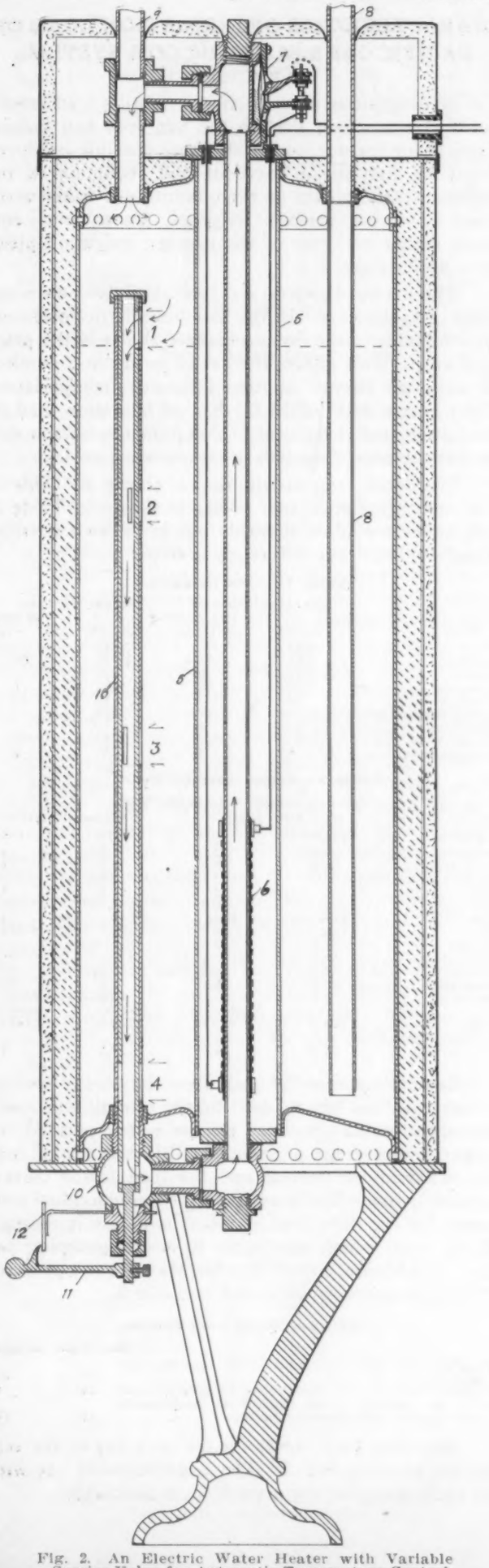


Fig. 2. An Electric Water Heater with Variable Service Valve for Automatic Temperature Control.

hours as is shown by the chart Fig. 4. The average temperature of water as it came from the tap was 184 deg. F.; the cold water temperature averaged 62 deg. The temperature of the water was thus increased an average of 122 deg. F. During ten days' service the current consumption was 24.5 kw.-hr. and the water used was 70.8 gal, or 589.76 lb.

The service efficiency was 86 per cent and the cost to the consumer was at the rate 1.03 cents per gal. at the rate paid which was three cents per kw.-hr.

Fig. 3 shows the load chart. This shows that water was used only during the usual office hours and it is apparent that if more water were used or the storage tank was smaller and current demand less, the apparatus would be still more efficient.

The writer is indebted to Mr. H. S. Lane of the Pacific Gas & Electric Company, who was in charge of the test, for data and the loan of load charts.

A point not to be overlooked in the case of doctors or dentists who use hot water is that boiling hot water can be constantly available. In the usual lavatory service a further economy results from very hot water. It is necessary to mix it with cold in the bowl and consequently results in saving heat which would otherwise be wasted by running away.

In the problem of domestic service much depends on the quantity of hot water available on different days in the week. Usually a larger quantity is necessary on Saturday or Monday than on the remaining days. It is also desirable that the water be very hot. The all week service efficiency is all important and by constructing the heating system as outlined in the description which follows, an all week service efficiencies of 90 per cent and over are possible.

A hot water boiler as shown in Fig. 2 surrounded by heat insulation is provided with an inner tube or casing (5) which is welded or riveted into each head. In this tube the usual circulating water heater (6) is installed. In circuit with this heater is connected a temperature control switch (7) which opens and closes the circuit depending on the temperature of the water passing through it. The usual inlet pipe (8) and outlet pipe (9) are arranged as in the ordinary kitchen boiler.

To provide for automatically maintaining hot water in only a portion of the tank the variable service valve (10) is provided. This valve is directly connected to the heating element circulating pipe and is arranged to admit water at certain levels in the tank to the heating element. Openings 1-2-3-4 are arranged to open successively as desired by moving the lever (11) to the corresponding number on the scale (12).

The water is heated to the desired temperature by passing through the heating unit once. After the hot water has reached the level of the opening in the valve it passes into port as at (1) and in passing through this element the temperature is raised sufficiently to cause the switch (7) to open the circuit. The advantage of this arrangement is that during the period of low water demand only a small portion of the boiler is maintained at a high temperature. The radiation losses are thereby reduced to the minimum. The method of stratifying the water into zones or levels of different temperature has been found to be entirely successful as diffusion of heat goes on very slowly in

still water. Provision is also made for the removal of scale. The thermal switch (7) will also protect the

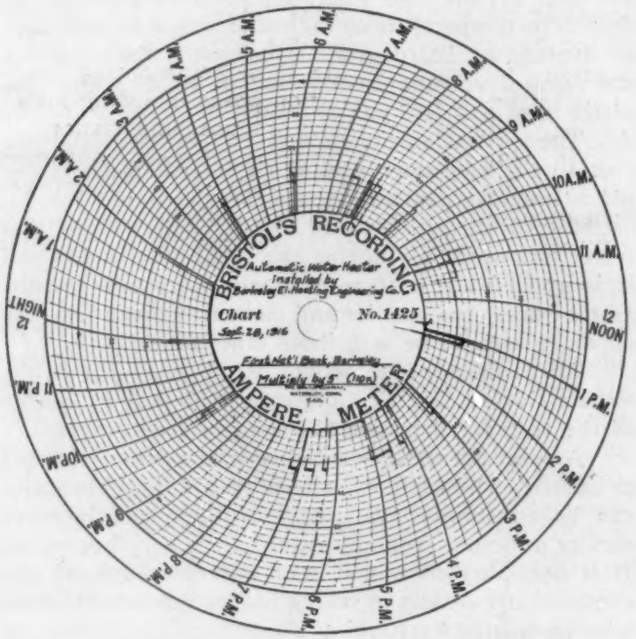


Fig. 3. Load Chart for Test of Electric Heater.

unit from excessive temperature, should scale form in the circulating pipe. Failures of heating units are rare.

In any case the heater or tank should be located as close as possible to the hot water tap, and all hot

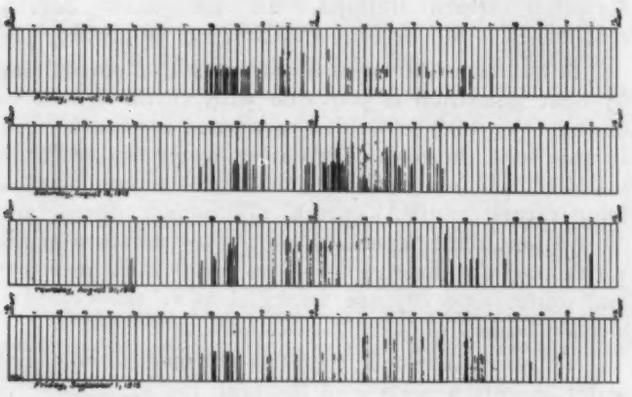


Fig. 4. Charts showing Periods when Water was Drawn During the Test of an Electric Water Heater.

water pipes insulated and so installed that no heat will travel along the pipe by reason of water circulation while the water is not being used.

Water diverted per acre by all the projects of the U. S. Reclamation Service averaged 5.38 acre-feet in 1914. Of this 2.87 acre feet per acre or 57.6 per cent of the amount diverted was delivered to farms. Of the 42.4 not delivered 7.1 per cent was wasted from the canals and 35.3 represented seepage and evaporation losses. A total area of 782,208 acres was irrigated in 24 projects, the total diversions exceeding four million acre feet.

CHARACTERISTICS OF IRRIGATION LOAD ON PACIFIC GAS & ELECTRIC CO'S. SYSTEM.

BY F. C. PIATT.

Investigations of the actual irrigation load conditions were made in 1914 in the San Jose and Solano districts for the purpose of studying possible improvements in distribution methods and reduction in investment. Many data on the quantities of water used, types of crops, acreage irrigated, water level and hours of use per year of the average irrigation plant were also collected.

These two districts are typical of two different types of agriculture. In the San Jose district orchards predominate; in the Solano district alfalfa is the principal crop. This affects the use of power in a number of ways, as shown in the following comparisons. There was a total of 13,275 h.p. of irrigation load in the San Jose district, and 3755 h.p. in the Solano district at the time these investigations were made.

The detail crop distribution is shown in Table 1. The monthly distribution of use is shown in Table 2. The difference in the monthly use in the two districts is mainly due to the difference in crops.

Table 1.—Area Irrigated.

	San Jose District.		Solano District.	
Crop.	Acres.	Per cent of total.	Acres.	Per cent of total.
Total	8,425	..	5,352	..
Alfalfa	1,543	18	3,739	70
Prunes	2,744	32	20	..
Apricots	1,060	13	331	6
Peaches	395	5	783	15
Miscellaneous fruits	1,659	20	110	2
Tomatoes	537	6	0	..
Truck crops	426	5	68	1
Miscellaneous	61	1	301	6

Table 2.—Actual Average Hours.

(Full Connected Load was Used.)

	San Jose District.		Solano District.	
Month.	1913.	1914.	1913.	1914.
January	10.0	1.0	.3	4.4
February	26.2	1.0	8.2	4.8
March	90.4	2.4	53.8	4.7
April	125.	9.0	99.1	9.2
May	160.	60.6	161.	28.1
June	144.	141.	182.	74.5
July	119.	89.0	180.	109.
August	87.7	63.0	206.	118.
September	50.3	55.2	138.	83.0
October	56.5	46.2	112.	38.4
November	23.2	25.4	2.5	10.6
December	4.0	....	13.9	....
Total	896.3	493.8	1,156.8	484.7
Consumer's load factor	10.2	5.7	13.2	5.7

Load Factors.—Table 2 also shows the annual consumer's load factor. In 1913 the rainfall was much less than normal, so that pumps were operated for longer than average periods. In 1914 the rainfall was somewhat above normal and the load factor correspondingly low. The load factor of the individual consumer for the days that his plant is in use is roughly 40 per cent, which represents 10 hours' pumping per day. In addition, circuit load factors were compiled for different conditions, as shown in Table 3.

Table 3.—Circuit Load Factors.

	San Jose.	Solano.
Weighted average of circuit load factors, day of peak	.49	.58
Weighted average of circuit load factors, annual	.151	.163
Total for district from individual consumer's load factor and diversity factor	.122	.156

The daily load curves for the peak day of the season are given in Fig. 1. The large day-time use with the reduction over the noon hour is noticeable.

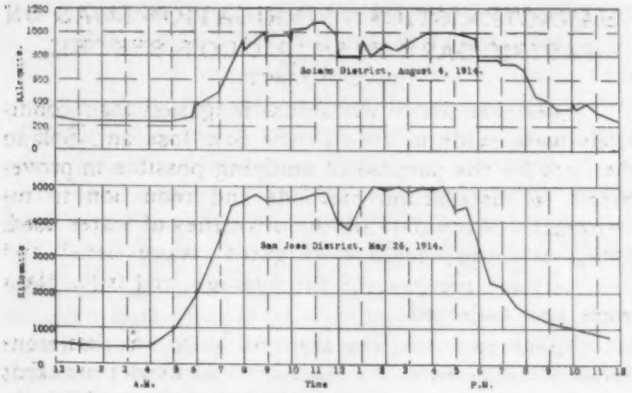


Fig. 1. Daily Irrigation Load Curves for Day of Peak Load for System.

The daily station peak load for the San Jose district for the months of largest use is plotted in Fig. 2. The marked reduction on Sundays is very noticeable. Use of power is maintained through October, as shown in Table 2.

The daily station peak load for a typical circuit in the Solano district in August, 1914, is shown in Fig. 3. The smaller Sunday use is also noticeable, but not to as great an extent as for the San Jose district.

Demand Factors.—Demand factor may be defined as the ratio of kilowatts actual demand to kilowatts connected load. In the case of a motor, the kilowatts connected load would be the kilowatts input with the motor delivering its rated output. Instead of the true demand factor, the ratio of kilowatt demand to horsepower rating is often employed for the reason that it is more closely allied to the rate schedule, and simpler to apply practically. Assuming an average motor efficiency of 86 per cent, the true demand factor is obtained by multiplying the empirical ratio by 1.15.

For the San Jose district, the average actual demand factor was 0.79, and the kilowatts demand per horsepower of rating was 0.685. For the Solano district, the similar figures were 0.85 and 0.74, respectively.

Diversity Factor.—The diversity factor between consumers on the same circuit is defined as the ratio of the sum of the individual consumer's maximum demands (non-simultaneous) to the maximum circuit demand.

As actually measured, it involves obtaining by test as many consumers' maximum loads as possible, computing the remainder by means of an average demand factor and comparing the sum with the circuit peak, as shown by the station log or graphic meters. All computations are based on demands lasting 15 minutes or longer.

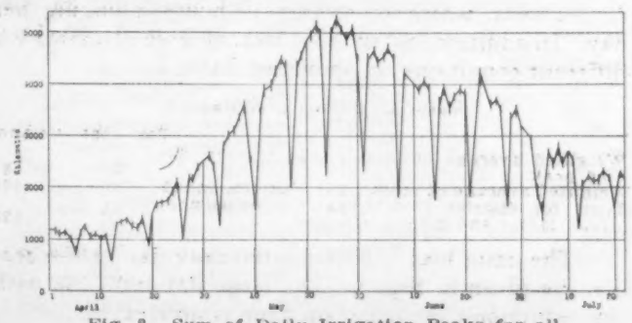


Fig. 2. Sum of Daily Irrigation Peaks for all Circuits, San Jose District.

The diversity factor thus obtained is lower than the theoretical diversity, due to the fact that the peak load on the circuit, as shown by the meters, includes losses in the primaries, transformers, etc., in addition to the instantaneous sum of the diversified loads. The diversity factors given are those representing conditions as they are, with station peaks including losses, as this is the only figure of practical importance.

In addition to the diversity between consumers on the same circuit, there is also diversity between irrigation circuits fed from the same substation, and between irrigation peaks of substations in the same district, etc.

The diversity factors obtained are relatively low, due to the fact that irrigation is carried on almost simultaneously by most of the farmers. The long lines are more likely to have high diversity than the short lines, as they naturally extend over a variety of land suitable for various types of crops. Lines supplying alfalfa will have a higher diversity than those supplying chiefly fruit, as shown by relative results in Solano and San Jose. This is because the irrigation of alfalfa is continuous for a period of 5 or 6 months, the exact time at which each farm is flooded depending largely on the conditions on the individual farm.

With fruit, the natural period of ripening forces all the farmers to irrigate at about the same time, generally a few weeks before the fruit is ripe. Other irrigation is also generally given after the fruit is off the trees, and again in winter.

The prospect of improvement in the diversity factor in the future does not seem very encouraging, as the farmers are more closely standardizing irrigation methods, thus making it more probable that all will irrigate at about the same time of year, with a resulting lower diversity factor. The diversity factors for different conditions are given in Table 4.

Table 4.—Diversity Factors.

	San Jose District.	Solano District.
Between consumers on a circuit.....	1.47	2.27
Between circuits	1.14	1.07
Between consumers and district peak	1.67	2.43

Additional Irrigation Data.—Table 5 shows some details with regard to average size of pumping plants and the acreage supplied per plant.

Table 5.—Additional Irrigation Data, 1914.

	San Jose District.	Solano District.
Acres per plant; average.....	47.	37.1
Connected h.p. per acre.....	.546	.375
Average h.p. per plant.....	25.0	15.0
Kw. demand per acre.....	.374	.273
Average discharge g.p.m.....	571.	351.
Average discharge g.p.m. per acre.....	12.2	15.3
Average depth to water; not pumping.....	45.5	24.4
Average depth to water; when pumping....	60.3	36.4

The figures for horsepower per acre, average pump discharge and discharge per acre are of interest as indicating practice followed in the territory covered, but are a proper guide to future installations only if the farmers are using water in the most efficient manner.

The water levels within the San Jose district show unexpected variations that are not explained by surface topography, being probably due to the configuration of the substrata. In the Solano district, the water levels between wet and dry years may vary 15 ft. The known fluctuation near San Jose is from 25 to 30 ft., the average for 187 plants being 27.4 ft.

By multiplying the average hours' use per year by the average rate of discharge per acre in 1914, the re-

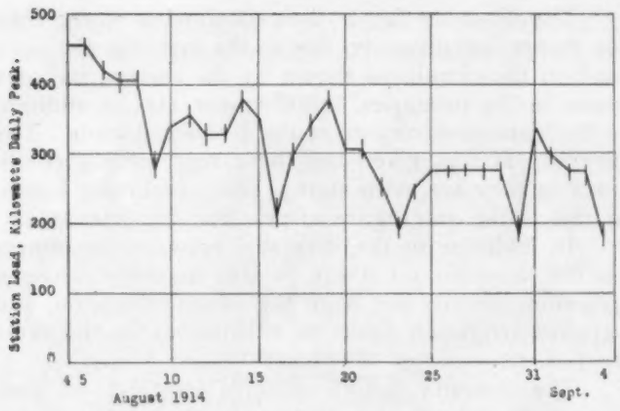


Fig. 3. Monthly Load Curve, Rice Line, Dixon Substation, Solano District.

sulting estimated water pumped in inches depth per acre becomes 13.4 for the San Jose district, and 16.8 for the Solano district. Similar figures for 1913, using the same pump discharge as for 1914, were 24.3 and 39.1 inches, respectively. Due to the lower water level in 1913, less water would be pumped so that these figures are somewhat excessive. In the San Jose district there is some winter irrigation from ditches fed from streams so the depth of water given above is not all the water actually put on the ground per year.

HYDROELECTRIC DEVELOPMENT IN NEW ZEALAND.

A statement has just been given out by the chief electrical engineer connected with the Public Works Department of New Zealand covering the Lake Coleridge Government Hydroelectric Plant located on the outlet of Lake Coleridge in the Canterbury District in the South Island, this being the first government electric plant on a large scale in this Dominion.

This plant has cost the government $1,601,079, and the first year's operation shows that the plant paid operating expenses, although only a small proportion of the power was sold.

According to the report, the introduction of hydroelectric power into Christchurch has caused the retail price for domestic lighting to fall from 12 cents to 6 cents per unit, and the retail price for power from 6 cents to 3 cents per unit, and the price for power in bulk from 4½ cents to 1 cent per unit.

It is reported that there are a few electric vehicles in Christchurch using current from this plant, with the result that the power costs much less than one-half of the cost of benzene or gasoline.

This seems to demonstrate that the hydroelectric development in New Zealand can be successfully undertaken by the New Zealand government, and it is proposed to install similar plants in the North Island, and with that in view surveys are being extensively made of two special systems, each located within a radius of 100 miles of Auckland.

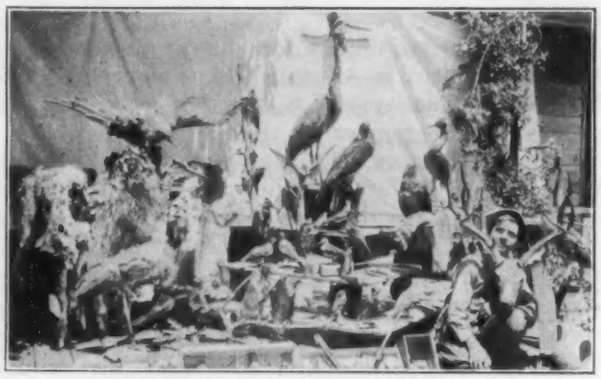
It is probable that these schemes will be well in hand for development shortly after the close of the war, and it would be well for American interests to get in touch so as to be posted in regard to these developments as they proceed.

OUTDOOR DIVERSIONS IN THE REGION OF HYDROELECTRIC CONSTRUCTION CAMPS.

Much has been written concerning the accomplishments of engineers in their construction work in the high Sierras and other mountain fastnesses of the West. Little has been said on the other hand, concerning the wonderful out-door life they and their families enjoy while such work is in progress.

Here is a picture of a thirteen-year-old lad, whose uncle has one of the sub-contracts connected with the Hetch Hetchy work. His hours of leisure in this wonderful section of country have been spent in perfecting himself as a naturalist along which lines he has already attained some eminence.

About a year ago one of the professors of vertebrate zoology from the University of California happened through and upon noting Donald McLean's rare



A Profitable Diversion in an Hydroelectric Region.

collection engaged his services for procuring certain specimens of which the university is in need. So as each month goes by Donald is finding that he is more able to put to a practical use his immense store-house of bird lore.

Donald's collection of some two hundred different specimens as shown in the illustration is most interesting to observe at close range. Almost every conceivable bird known to the layman at least may be found among them. They range all the way in size from the tiniest bird in America known as the Calliope Humming bird which spreads its wings scarcely three inches, to the great Blue Heron that measures over seven feet from tip to tip of wings.

SOME RECORD-BREAKING CROP YIELDS.

The Bureau of Crop Estimates of the Department of Agriculture recently quoted the following as the highest yields reported by their field men or correspondents:

		Yield per	Locality.	
Crop.	Unit.	acre.	State.	County.
Wheat	Bu.	117	Washington.	Island.
Oats	Bu.	184	Washington.	Skagit.
Barley	Bu.	123	Idaho.	Twin Falls.
Flaxseed	Bu.	30	Montana.	Fergus.
White potatoes.	Bu.	790	California.	Eldorado.
Sweet potatoes.	Bu.	600	Tennessee.	Roane.
Cotton	Lb.	6,000	Georgia.	Toombs.
Rye	Bu.	54	Nebraska.	Lincoln.

These represented single fields or small tracts varying from 1 to 20 acres.

INDUSTRIAL CHANGES IN EUROPE.

In an address given during the week just past by Edward N. Hurley, chairman of the Federal Trade Commission, Mr. Hurley emphatically called attention to the fact that America must wake up to her presday day responsibilities. He said in part:

When we think of Europe we think of a continent engulfed in war, devastated and disordered, but I want to say to you, that we must correct that conception. While in many respects we know little of what is going on in the warring nations, we do know that within sound of the guns, almost within reach of the falling shells, Europe is reorganizing her industries. Under the stress of a life-and-death struggle every effort is being to obtain the highest efficiency in the production, the distribution and the use of commodities of all kinds. Conservatism in industrial ideals and methods has been blasted and shattered to pieces in the shock of war, old systems that normally would have hung on for years have been discarded in a day, old equipment that would have been retained for years has been scrapped as fast as possible for new installations of the most advanced types. New processes are being discovered, new inventions are being made, and new forms of organization are being created. Let me illustrate. Industrially, France has been preeminently the land of small scale, highly individualized production, but she now lacks human hands. In France little farms that for generations have been farmed practically by hand or with the aid of a horse or two, are being thrown together and farmed co-operatively by tractors, gang plows and modern agricultural implements. France must rely on machinery. Her business men are studying and are applying American systems of manufacture in factory construction, in equipment and in large-scale, highly systematized production.

England industrially has been pre-eminently the land of yesterday. Conservatism was the dominant characteristic of British business. While Massachusetts was making textiles with automatic looms under conditions that permitted one operator to tend from 16 to 24 machines, Lancashire clung to old equipment and conditions under which one operator could tend but four machines. But at last England is aroused, and today American books on efficiency and scientific management are being bought by the hundred and studied all over England. The war has compelled Great Britain to make thirty years of industrial progress in thirty months.

Before the war Germany was probably the most highly organized and efficient manufacturing nation in the world, but in Germany organization and efficiency have been still further developed, and, no matter whether victorious or defeated, the Germany that emerges from the war will be years ahead of the Germany we knew in 1914.

These changes are of great concern to us. We may not realize this today, because things are coming our way now, but we must look ahead to the future conditions we must prepare to meet. Almost before we know it we will find a new Europe competing against us with war-sharpened brains and war-hardened muscles, not only in our foreign markets but also right here at home. If our industries are not to be caught slow of mind and flabby of muscle we must improve our business organization, must increase our manufacturing and merchandising efficiency and must keep pace with every step in Europe's industrial progress.

A gopher bounty of 10 cents each is paid on the North Platte project in Nebraska by the water users. In 1915 bounty was paid on 33,580 gophers. An assessment of 3 cents per acre has been made to cover the bounty for 1916. About 70,000 acres were irrigated on this system in 1915.

HOW CROP STATISTICS IN IRRIGATION ARE GATHERED.

Crop or other agricultural statistics can be secured in various ways. Such statistics may be needed for irrigation or for agricultural power. The U. S. Reclamation Service secures yearly quite complete data from each landowner under its systems on the yield and value of all crops, areas cultivated, amount of stock, etc. These are desired for use in determining the progress of development on each project and the results being secured from the use of water. They are secured by means of an individual canvas.

Other systems may desire data on the average yield of crops or other factors connected with the farms. One method used is to select a certain number or proportion of all farms and use the average of these as the average of all. This has the advantage of cheapness and if fairly selected the results may be reasonably accurate. At least 75 to 100 farms should be used to give an average for large areas.

Inquiries through the mail will not generally give satisfactory results. Usually not over 30 or 40 per cent will reply and many of those received will be incomplete. Where water or power is paid for monthly it may be possible to get the users to furnish answers to such inquiries when making or mailing payments.

The area of each crop irrigated on each farm is often needed in planning the operation of irrigation systems, particularly under rotation methods of delivery. This can be secured by making the filing of such data with the annual application for water a prerequisite of service.

In collecting data from individual farms one man can usually cover about 20 farms per day. If the data collected is general and the farms small, a larger number may be secured per day. If many return trips are required to find those missed at the first call or if much detail is required, the average number of farms per day may be less than twenty.

Data on special crops may often be available from other sources. The sugar companies have quite complete data regarding areas under beet contracts. Various selling organizations may have much useful information regarding the crops which they handle. Such information may be used to lessen the amount and expense of statistics collected directly from the farmers.

In many cases information may be desired on matters of which the farmer keeps no definite record. Such a question would be the time pumping plants are operated at a flat rate schedule. It has been found by the U. S. Department of Agriculture that the average of a sufficient number of individual estimates on such questions will usually be quite closely correct unless there is some outside element to affect all estimates.

The engineer in his business life may draw a forceful lesson from the farmer. The farmer who regretfully says, "A poor crop this year! Oh, well, a better one next year!" may be a bit of a philosopher, but he is not much of a farmer unless he gets busy and tries to find out **why** the "poor crop this year" and what he must do to avoid such a result under similar or worse conditions in the future.

PLANS FOR AMERICA'S ELECRICAL WEEK AT SAN FRANCISCO.

San Francisco is the first of the Pacific Coast cities to decide upon a complete plan of action for tying in locally with the Society for Electrical Development's national celebration of America's Electrical Week. In a report to the general committee, of which John A. Britton is chairman and S. V. Walton vice-chairman, the committee of arrangements, consisting of F. H. Leggett, R. M. Alvord, E. B Strong, S. V. Walton and P. C. Butte has recommended a comprehensive participation as follows:

(1) The center upon which all other activities is to be focused are six electrical demonstration shows to be conducted in each of the several districts of the city. The largest will be a great exhibit illustrating the use of electricity on the farm and in the home which will be installed in the nave of the Ferry Building, in connection with lectures on electricity by the California Development Board. Another exhibit is to be installed in the board room of the Chamber of Commerce in the Merchants' Exchange Building. Still another will be put in a large vacant store in the heart of the retail shopping district. The Western Addition will be taken care of by a demonstration room located close to Fillmore and Sutter streets. The Richmond District, by a store at Sixth and Clement, and the Mission by a store at Twenty-second and Mission streets. In each case these stores are to be rented by the committee for two weeks' period and in them will be installed a complete working exhibit of various types of household appliances, including electric ranges, electric water heaters, heating devices, washing machines, irons, vacuum cleaners, lamps, etc. Each of these stores will be in charge of a salaried attendant and each device will be demonstrated by women demonstrators furnished by the various concerns exhibiting the apparatus.

Each store is to be equipped with electric signs and is to be handsomely furnished throughout. No devices are to be sold, though a pamphlet will be printed giving a list of the dealers from whom the materials may be purchased. The general committee will stand the entire expense of these six exhibits, allotting the space to interested companies in proportion to their amount of subscription toward the expenses of the week. These subscriptions will be solicited from the central stations, manufacturers' representatives and jobbers. The dealers will not be approached on this part of the program.

(2) As indicated in the above, the Chamber of Commerce and the California Development Board are co-operating actively in the campaign plans, being represented on the committee by Mr. Newton Lynch. The San Francisco Chamber of Commerce, which is the largest chamber of commerce in the United States, has over 8000 members. They issue a weekly bulletin on activities and will devote the first page of two issues exclusively to the plans. The California Development Board send out 35,000 bulletins each month, which will contain full notice of the week's activities. Both organizations will use poster stamps on all outgoing mails. The California Development Board will give daily lectures on electricity in their rooms in the Ferry Building and will of course emphasize the exhibit in the Ferry nave. As the Ferry nave is the largest passenger terminal in the world, with the possible exception of Paris, handling an average traffic of more than 125,000 persons daily, the exhibit in the nave should be particularly effective.

(3) The ballroom of the Palace Hotel has been reserved from November 29th until December 9th, for the purpose of holding electrical lunches which will be given each day throughout the week to such civic organizations as the Down Town Association, The Ad Club, Home Industry League, Commonwealth Club, Rotary Club, etc. A comprehensive exhibit of electrical devices will be arranged in this room for the inspection of those attending the lunches. Each Club will be invited to hold its lunch in this room on its regular meeting day and the members will pay for their own lunches. The committee will provide a speaker on some electrical subject, will distribute literature and pull off various spectacular electrical stunts. In the afternoon, tea will be served to the ladies without charge and all the Women's Clubs about the bay will be invited to hold their meetings there and use the room as headquarters for members during the week. It it quite likely also that several evening lectures will be given in the ballroom.

(4) Every night throughout the week there is to be a street car pageant over the tracks of the United Railroads, who have donated flat cars and the use of their tracks for this purpose. An illuminated electric flag will head the pageant, then there will be a float showing "how grandmother kept house," featuring candles, spinning wheel and cooking over the fireplace, then a float "how mother kept house," showing kerosene lamps, wood stove, wash-board and tubs, broom and sad irons; and then a car "how to keep house electrically," playing up electric lamps, ranges, washing machines, vacuum cleaners and electrical appliances in general. The schedule of this pageant will be announced regularly in the papers.

(5) The use of billboards for poster advertising. After due consideration of a "half-showing" of the Society's 8-sheet poster in conjunction with the 16-sheet poster playing up the "Shop Early" and electric Christmas idea and calling attention to the demonstration rooms, the committee decided that half the number of handpainted boards displayed at carefully selected locations would be more effective. Consequently thirty-two such boards were authorized.

(6) Newspaper advertising. It is planned to publish co-operative electric pages in all daily papers during the week. Furthermore, an announcement for the week's activities will be printed in the amusement columns of each paper. Definite arrangements have been made for a complete publicity service covering Central California to supplement paid advertising.

(7) Lectures and demonstrations on electricity are to be given in the High Schools throughout the week.

(8) Complete plans for distributing the advertising matter furnished by the Society of Electrical Development throughout Central California have been worked out. This includes not only the use of poster stamps on outgoing mail of the Chamber of Commerce and California Development Board, but also the Pacific Telephone & Telegraph Company, Pacific Gas & Electric Company, Great Western Power Company, Northern California Power Company, Coast Counties Gas & Electric Company, and the Coast Valleys Gas & Electric Company. This will mean that practically every householder will receive at least one direct announcement of the week. Of course, extensive display of the Society's literature and electrical devices will be made by each central station and dealer throughout the territory.

The general committee consists of John A. Britton, vice-president and general manager, S. V. Walton, commercial manager, and L. H. Newbert, sales manager Pacific Gas & Electric Co.; M. L. Scobey and Jas. W. Redpath of the California Association of Electrical Contractors & Dealers; Carl E. Heise, district manager Westinghouse Electric & Mfg. Co.; F. H. Leggett, Pacific district manager Western Electric Co.; W. W. Briggs, general agent Great Western Power Co.; Dr. Thomas Addison, Pacific Coast manager and R. M. Alvord, supply manager General Electric Co.; T. E. Bibbins, president, and W. L. Goodwin, vice-president Pacific States Electric Co.; C. L. Chamblin, manager California Electric Construction Co.; Paul C. Butte, Butte Engr. & Elec. Co.; E. B. Strong, Journal of Electricity, Power and Gas; H. V. Carter; Robert N. Lynch, vice-president and manager Chamber of Commerce. A. H. Halloran has been engaged as campaign manager for the week.

SPARKS—CURRENT FACTS, FIGURES AND FANCY

An electric boiler heater is being tried at Spokane, Wash., as a means for keeping the water warm in a fire engine between calls.

* * *

The salt content of the Pacific Ocean is 79. lb. per ton of water, of the Atlantic Ocean, 81 lb., and of the Great Salt Lake 175 lb.

* * *

Prosperity still continues among western mine owners and operators. In Butte, Montana, a monthly pay-roll of two and one-third million dollars, by far the biggest in its history, is now operative.

* * *

A unique register is maintained by the Pacific Gas & Electric Company at its Lookout Point near Emigrant Gap on the Lincoln Highway where a bird's eye view of the Lake Spaulding development may be obtained. Already a long list of distinguished names is enrolled.

* * *

Interesting compilations of governmental statistics show that the total annual cost of running the United States government is nearly a half billion dollars, while that of running the forty-eight states in the Union totals over a billion dollars annually.

* * *

"No house too old to be wired" is a catch-word of a New England central station company which is campaigning for the electrical equipment of all the homes in its territory. Recently the management had to make good by wiring old colonial homes built in the seventeenth century.

* * *

Contrary to prevalent ideas, castor oil has a wider application than that of its medicinal uses. In India, where the castor-oil plant grows, the oil is largely burned. It is believed to give a cooler and brighter light than other vegetable or mineral oil and it is said to burn more steadily.

* * *

Engine distillate, as obtained from California crude oil is a product too low in flash point to be used in kerosene and too high in boiling point to be used as gasoline or naphtha. It is frequently used to operate motor trucks and in the proportion of 40 per cent distillate and 60 per cent gasoline is also used in pleasure cars.

* * *

Members of the Naval Reserve Board have been placed on the rolls of the U. S. Navy Department as "officers of the United States Government." Immediately upon taking the oath of office the board members effected a permanent organization. Thomas A. Edison was elected chairman. William L. Saunders of the American Institute of Mining Engineers, and Dr. Peter C. Hewitt of the Inventors' Guild, both of New York City, were selected as vice-chairmen, and Thomas Robbins of the Inventors' Guild was appointed secretary.

More than three thousand feet above the center of the island state of Tasmania, the waters of the Great Lake are now harnessed in one of the greatest water power schemes yet planned in Australia. This government hydroelectric plant develops one hundred thousand horsepower, contracts for the sale of which have already been closed.

* * *

The new federal revenue bill, signed by the President on September 8, 1916, repeals the tax imposed on telephone and telegraph messages by the Revenue Act of October 22, 1914. It has therefore been unnecessary to collect the federal tax on such messages since midnight of September 8. All such taxes are to be collected, however, on messages sent prior to that date and not paid for.

* * *

More than four million dollars' worth of silk, the largest shipment from Japan this year, left Seattle recently in sixteen special cars over the Chicago, Milwaukee & St. Paul Railway for New York City. This railroad is the first to electrify its transcontinental system. It would seem that the next step would be to electrify Western industrial life so that this raw product might be manufactured in the western instead of eastern centers.

* * *

Apropos of the statement in recent press dispatches that Norway has just put into operation the first stone vessel ever built, resembling a barge, the ribs of steel and the hull of concrete, the Bureau of Navigation, Department of Commerce, says that it may be worth noting that the scows A. S. and G. Company, No. 33 and No. 66 were built of concrete at Fairfield, Md., in 1912 and 1913, respectively, by the Arundel Sand & Gravel Co., of Baltimore, Md. These vessels measure approximately 112 ft. in length and 28 ft. in beam, and it is believed they are the first vessels ever built of concrete. The No. 66 was abandoned as unfit for service in the early part of the current year and the No. 33 is still in commission.

* * *

The earliest record of standardization to be found is in the introduction of the Greek alphabet initiated by Xerxes and which was refused by China and Russia. However that may be the most notable step in the realization of engineering standards, in so far as Great Britain is concerned, was in 1841, when Sir Joseph Whitworth introduced his standard screw thread. When urging the necessity for standardization, he illustrated his argument by mentioning that candles and candle-sticks were in use in almost every house, and nothing could be more convenient than for the candles to fit accurately into the sockets of the candlesticks, which they seldom did. The lesson taught by his illustration lies at the root of standardization and necessarily carries with it disadvantage to the few for the advantage to the many.

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NOTICE TO ADVERTISERS.

Change of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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Encouragement of Private Investment

"Voluntary investment in privately owned utilities (in California) is awaiting the determination of public policy relative thereto." This significant sentence succinctly sums up the utility situation not only in California but throughout the West. It is used by J. P. Lippincott, a well-known consulting engineer of Los Angeles, in the course of a paper on "Rates for Municipally Owned Public Utilities" as published in the September, 1916, Proceedings of the American Society of Engineers.

This statement is of wider scope than is covered by the author in his argument that the rates of a publicly owned utility should be based on operation, plus depreciation, plus reasonable interest on value, as are the rates of a privately owned utility. It embraces several of the underlying reasons for the present stagnation in utility investment in the West.

Recently there have been but few voluntary investments in Western utilities. Electric power companies have bought only such new equipment as depreciation and maintenance of service required. Were it not for the needs of the more prosperous industries of mining, lumbering, agriculture and ship-building, the electrical jobber and manufacturer would have but little business aside from the sale of lamps and household devices. Most of the power companies have confined their new development to plants which were planned three years or more ago.

New investment is awaiting the determination of public policy thereto. With the encouragement of private capital a great flood of Eastern money will flow into Western developments. With discouragement, this capital will seek other fields.

The agitation for municipal ownership of public utilities in the West is mostly in talk and not in deeds. In California nearly 95 per cent of the value of the street railways, gas and electric systems, water plants and telephones and telegraphs is privately owned. Excluding the water plants, the ratio is a fraction of one per cent. The prime reason of course, is that public funds are more needed for such other utilities as schools, sewers and roads.

The privately owned utilities are closely regulated as to rates and service. The publicly owned are not. Neither can a municipality be restrained from invading the field of an operating utility. Equity would at least suggest the same basis for rate-making so as to protect legitimate private initiative. The municipal plant represents an investment of public funds, the use of which should return a profit to the city instead of occasioning a loss as is the case when the general tax fund is drawn upon to pay interest and retire bonds. Consideration should also be given to the fact that the public utilities bear the burden of taxation. Whatever lessens their income reduces the tax receipts from this source and consequently increases the taxes of the private property owner.

To hasten the coming of the awaited day when public policy will be definitely determined and to create a favorable attitude of public mind toward private investment might well be the task of existing utilities. Aggressive action should replace passive waiting. Electric railway, telephone and power company officials know the facts, know that future development is

dependent upon both private and public investment. The public does not realize this. To teach the public this becomes a duty and a privilege which ought no longer to be neglected.

Hydroelectric Development vs. Steam Power

Due to the increasing market value of crude petroleum Western central station managers are once again confronted with the problem of hydroelectric development as compared with steam power for electric generation of energy.

During recent years the gigantic growth in consumption of electric energy foretells an unprecedented increase in the use of electricity from large and economical power stations in all kinds of industry requiring mechanical power. It means that electric power is to find an ever increasing usefulness in reducing certain metals, such as aluminum, from its ores and the refining of metals such as copper, as well as the use of electricity in tempering, welding and forging operations, and also in the milling of iron and steel. On the Pacific Coast especially it means not only increased uses in agriculture but the steady growth of use in great electrochemical industries, including many kinds of products, among the largest in point of consumption being the fixation of nitrogen in the air, thereby producing valuable fertilizers and other by-products.

Of late years the steam turbine and its auxiliaries have been vastly improved in efficiency and adaptability. In addition to this increased efficiency due to more economical units and the increased capacity from concentration of a number of very large generators in one central station, improvement in load factor has also resulted. This comes from the increase in the diversity of service as pointed out in a recent editorial of the Electric Journal, making it possible to deliver a much greater total output with a given peak capacity.

Improvements in mechanical stokers, superheaters, economizers and other adjuncts to the boiler plant of large electric stations also add economy of electric current production in these large power plants.

Added to these improvements, the low market price of crude petroleum on the Pacific Coast has made the development of steam electric power a grave competitor of hydroelectric effort in the West even in localities where natural conditions made hydroelectric development favorable.

As if to aid still further the fight of steam power as opposed to hydroelectric power, legislation in recent years has been so adverse as to practically discourage further development along hydroelectric lines. Indeed in some instances it has been argued that water rights are a liability rather than an asset to a power company.

Be this as it may, the present increasing cost of crude petroleum, if it is to remain at such figures, will put an entirely new phase upon the situation.

With oil at seventy-five cents a barrel it was shown in a hearing before the California Railroad Commission that hydroelectric generation and steam generation were of equal cost in production in at least one great company of central California. This company, it might be mentioned in passing, controls some of the most valuable hydroelectric power possibilities in the West.

With oil soaring to a dollar per barrel, however, an entirely new condition of affairs is sure to exist. Hydroelectric development once again becomes the unquestioned champion of the field. It is certainly to be hoped that the crying need in readjusting the state or federal regulations of water powers which in recent years have proved unproductive of the fruitful results hoped for, will at once be met and opportunity given for a resumption of hydroelectric development so much needed in the West.

Efficiencies of Electric Water Heaters

In the Journal of Sept. 9, 1916, there appeared an editorial entitled "The Perfect Electric Water Heater." In this editorial it is shown that an ideal electric water heater, operating at one hundred per cent efficiency, can never raise more than 4.06 gallons of water one hundred degrees in temperature by the expenditure of one kw.-hr. of electrical energy.

Using this ideal factor as a basis of computation, the efficiency of any electric water heater is easily ascertained. All that is necessary for one to do is to operate the heater over a working period of several hours, note the electrical energy consumed, the temperature rise of the water and the gallons of water heated during the interval of electrical application.

In the determination of the efficiency of electric water heaters great care should be exercised in seeing that the heater is working under stable conditions of operation. Otherwise freak efficiencies, due to the absorption of heat by the heating elements and its later transmission to the water, may in some instances show a greater efficiency than one hundred per cent which is of course impossible of accomplishment.

The problem of the heating of water by electrical means is one of enormous proportion. It is hard to even guess at the possibilities that will ultimately be made effective under heat storage by water.

Electric cooking, the supplying of hot water for household purposes and the heating of buildings are mere beginnings in such uses. Under an efficient method of storage of heat energy the long looked for solution of filling up the valleys in the central station load is at once solved and the economic advantages to company and consumer can hardly be estimated.

A feature of the heater described on another page of this issue that is well worth noting is the attempt of the inventor to solve the question of varying temperatures to which water may be heated.

Advantage is there taken of the fact that water, being a poor conductor of heat, may successfully be heated to different temperatures in strata and each stratum drawn off when occasion demands such temperature as may be found in that corresponding section.

The continued effort of inventors to solve the problem of electric water heating is beginning to bear fruit and the day is not far distant when enormous economic readjustments in power consumption must result both to the benefit of central station and to consumer.

PERSONALS

R. J. Davis, agent for the Century Electric Company, is at Los Angeles.

Fred Skeel, manager of the Crouse-Hinds Co. at Chicago, is visiting the Pacific Coast.

T. E. Bibbins, president Pacific States Electric Company was at Los Angeles during the past week.

T. A. Hunter of the Southwest General Electric Company was at San Francisco during the past week.

F. E. Newberry of the F. E. Newberry Company of St. Louis was at San Francisco during the past week.

N. C. Van Fleet and **W. E. Hayes,** electrical contractors of Santa Rosa, Cal., were recent visitors at San Francisco.

F. Harvey Searight of the Allis-Chalmers Company is spending a few weeks in the High Sierras on his vacation.

J. G. Monahan, representing the Sangamo Electric Company at Los Angeles, has returned from an extended Eastern trip.

W. L. Goodwin, vice-president and general sales manager of the Pacific States Electric Company, is making an Eastern trip.

George A. Campbell, manager of the Truckee River General Electric Company, has returned to Reno from San Francisco.

C. R. Hunt, branch manager of the Robbins & Myers Co., recently returned to San Francisco from a ten days' business trip throughout the south.

H. N. Lauritzen, Holophane specialist with the Pacific States Electric Company, will spend the next month at the company's Portland and Seattle houses.

F. L. Webster, California manager of the Allis-Chalmers Company, has returned from a few weeks' motoring trip throughout the southern part of the State.

Walter M. Fagan, representative of the Hughes Electric Company, was recently married at Los Angeles. He will return to Chicago with his bride this week.

A. E. Chandler of the California Water Commission has left for Honolulu, T. H., where he is to assist the Hawaiian Water Commission in drafting a water code for the Islands.

E. A. Wilcox, formerly electric heating specialist with the Great Western Power Company, left San Francisco last week to attend the Jovian Congress at Indianapolis and visit Eastern cities.

R. D. Holabird of the Holabird-Reynolds Company and **C. C. Hillis** of the Electric Appliance Company attended the meeting of the Electrical Supply Jobbers' Association at Cleveland this week.

W. D'A. Ryan, illuminating engineer with the General Electric Company, addressed the Great Western Power Company's N. E. L. A. section at San Francisco October 8, 1916, on "The Path of Gold."

A. H. Halloran, vice-president and managing editor of the Journal of Electricity and Pacific Coast representative of the Society for Electrical Development, addressed the Los Angeles Jovian League, October 11th, on America's Electric Week.

J. E. Megson, formerly with the Busch-Sulzer Diesel Engine Company of San Francisco, is now supervising engineer of the St. Louis Light & Development Company, which are owners of twelve Diesel engine plants in the Middle West.

J. E. Baker has resigned as statistician for the Southern Pacific Company at San Francisco to become adviser to the Chinese Ministry of Communications at Peking, which has charge of all the mail, telephone, telegraph and railway systems in China.

C. L. Cory, professor of electrical engineering at the University of California, who is this year spending his sabbatical leave of absence from the university in the Eastern States, returned recently for a short visit in Berkeley and has again left for the East.

C. R. Gill, formerly superintendent of distribution for the Pacific Gas and Electric Company at Sacramento, has been made superintendent of the company's Placer county district with headquarters at Auburn, Calif. In recognition of his services his fellow employees presented him with a gold watch and chain during a dinner given him by the electrical men of Sacramento.

Eugene V. Griffes, who was general manager of the Oceanside Electric and Gas Company at Oceanside since 1905, has, since the sale of the company, returned to Los Angeles and located at 1134 Fielding street, Hollywood. Mr. Griffes is one of the earliest Associates of the American Institute of Electrical Engineers in Los Angeles, having entered in 1896, there being only one other member at that time.

MEETING NOTICES.

San Francisco Electrical Development and Jovian League.

The proposed San Francisco-Oakland bridge was the subject of an address by Harland D. Miller at the October 4th meeting, which was attended by nearly a hundred members. Mr. Miller's plan is for a bridge extending from the end of the Alameda mole to Second and Townsend streets, San Francisco, with an elevated loop to Second and Mission streets. The bridge would be 5½ miles long, consisting of a large number of short spans 25 ft. above tidewater. This would be sufficient to pass 95 per cent of the shipping, the remainder being cared for by a lift bridge. The cost is estimated at $22,000,000 and four years would be required to complete it. Pile foundations would be used for the piers. Mr. Miller emphasized the need for the bridge by dwelling on the danger of ferry service and by showing that the ferry terminal is the largest in the world, 125,000 people passing through it daily.

Los Angeles Jovian Electric League.

The fall session of the league was fittingly ushered in with a luncheon at Jahnke's Tavern, Wednesday, October 4th. The festivities were under the direction of A. B. Nauert of the United States Steel Products Company, chairman of the day, and Jovians to the number of 150 gathered round the festive board, which was tastefully decorated with huge clusters of beautiful dahlias of the prize winning variety, furnished for the occasion by Messrs. Sherart and Ebert. At President Holland's request, absolute quiet prevailed for thirty seconds, as all present sat with bowed heads in memory of J. Harry Pieper, whose loss has been so keenly felt by all who knew him. A resolution of sorrow read by R. J. McHugh was then adopted. A letter from Mrs. Pieper and resolution adopted by the Electrical Development and the Jovian League of San Francisco were also read. The secretary was instructed to draw up a resolution on the death of Wm. Graves of the Southern California Edison Co., a faithful member of the league, who recently passed away. The yearly election of officers will be held at the next meeting and a committee consisting of A. B. Nauert, N. G. Graham and H. N. Sessions was appointed to select the nominees. Charles C. Selecman, D. D., pastor of Trinity Methodist Episcopal Church, possibly the most popular orator of any that have addressed the league in the past spoke on "Personality" in a talk replete with epigrams and stories wonderfully refreshing and instructive. It is his opinion that, contrary to the old belief, the average person thinks too little of himself, adding "that the whole world moves on the invisible, intangible thing called 'personality'; the chief asset of nations, cities, commercial organizations and the whole human race."

NEWS OF IDAHO PUBLIC UTILITIES COMMISSION.

The Idaho Power Company has been authorized to refund to such of the municipalities, Glenns Ferry, Gooding, Jerome, Buhl, Wendell and American Falls, Idaho, as shall within six months from and after September 1, 1916, make a written election to take their municipal street lighting service under Schedule No. 4, of Tariff No. 5, of the Idaho Power Company, whatever difference there may be between the amount of the charges falling due to the company under its Schedule Q-2, for service supplied on and after August 1, 1916, up to and until the date of the taking effect in such territory of said Schedule No. 4, or up to and until such later date or dates as said municipalities may respectively elect to take service under said Schedule No. 4 within said six months' limitation, and the amount of those charges as they would have been if the same service had been rendered during the same period under the provisions of said Schedule No. 4.

NEWS OF THE CALIFORNIA WATER COMMISSION.

William H. Earl, for the Long Valley Irrigation District, has applied for permission to appropriate 550 cu. ft. per second of the waters of Long Valley creek, tributary to Honey lake in Lassen county for the purpose of irrigating 34,345 acres in the district. The intake canal, as proposed, is 10 miles long. The diversion dam is set forth as 100 ft. high, 365 ft. on top and 100 ft. on bottom of concrete and masonry, whose estimated cost is $1,000 000. The present application is really the perfection of a previous one filed to hold the priority on the water while the irrigation district was being formed and complete maps and data compiled.

M. D. Graham of Wakefield, Del Norte county, has filed an application requesting permission to appropriate 3 cu. ft. per second of the waters of Granite Gulch creek, tributary to Hurdy Gurdy creek, for placer mining purposes. The main ditch and flume, as proposed, will be two miles long and the diversion will cost about $1,500.

D. E. Kelliher and Katherine Kelliher of Eugene, Stanislaus County, have applied for permission to appropriate 2 cu. ft. per second, each, a total of 4 sec. ft., from Littlejohn creek, tributary to San Joaquin river, for irrigation purposes. Proposed main canals for the diversion will be about two miles long. There will be two pumping plants lifting the water from the stream to the canals at a combined cost of $6,250 for the whole works, to water 200 acres.

R. J. Aden of Vallejo has applied for permission to appropriate for agricultural purposes, 5½ cu. ft. per second of the waters of Putah creek in Lake county, within the Guenoc Rancho, by means of movable pumps of 6 and 8 in. dimensions, respectively. There is proposed to install 2,600 ft. of 8-in. pipe line and 4,000 ft. of 6-in. pipe line. The lift is about 20 ft. The estimated cost is $4,000, to water 616 acres.

Hartland Law and Nelson L. Salter of Emerald Bay, Placer county, have applied to the State Water Commission for permission to appropriate for domestic and power purposes the waters of an unnamed stream, tributary to Lake Tahoe. By means of a plant consisting of an 18-in. wheel, 4,700 feet of 4-in. casing, with a fall of 350 feet, applicants propose to generate about 10 theoretical horsepower, at an estimated cost of $2,100. The plant will be used for lighting the premises of applicants.

Louisa S. Paulsen of Lewiston, Trinity county, has applied for permission to appropriate for placer mining purposes 20 cu. ft. per second of the waters of Rush creek, tributary to Trinity river in that county. There is a proposed main ditch 3½ miles long, with hydraulic giants, the estimated cost of the works being $5,000.

Sara Brodek of Los Angeles has applied for permission to appropriate 28 miner's inches of Brodek canyon in San Bernardino county, for use on 240 acres at an estimated cost of $7,500.

TRADE NOTES.

Westinghouse Electric and Manufacturing Company, Westinghouse Lamp Company and R. D. Nuttall Company announce the removal of their San Francisco offices to the seventh floor of the First National Bank building, 1 Montgomery street, San Francisco, Calif.

The Electric Specialty Company, 525 Market street, announces that it is representing The Mica Insulator Company, New Jersey; The Continental Fibre Company, Newark, Del.; The Reynolds Electric Company, Chicago, Ill.; The Barkelew Electric Manufacturing Company, Middletown, Ohio.

Western Electric Company anticipate that this year's sales will nearly touch the hundred million dollar mark, considering only actual shipment of goods to customers. Incoming orders booked will greatly exceed this figure. The company's previous biggest year's gross was $77,000,000. The directors have authorized plant additions costing over $1,000,000 to care for demands. Over 23,000 people are now on the pay-roll.

NEW CATALOGUES.

Wm. B. Scarfe & Sons Company of Pittsburgh has just issued an attractive booklet of seventy-two pages on the subject of scientific water purification for all purposes. The booklet is well illustrated and should prove valuable to all interested in the subject of water purification.

Federal Sign System (Electric) has issued a complete loose-leaf catalogue in board binder. After giving full details regarding embossed letter signs, roof signs, special display and panel signs, there are sheets devoted specifically to the needs of industries using signs,—central stations, theatres, garages, drug stores, etc. Reference is facilitated by thumb index so that ready selection may be made of data pertinent to any business.

BOOK REVIEWS.

Handbook of Machine Shop Electricity. By C. E. Clewell; 4 by 6½ in.; replete with tables and illustrations; pliable binding; first edition. Published by McGraw-Hill Book Company of New York City, and for sale at the Technical Book Shop, San Francisco. Price, $3.00.

This book was undertaken about two years ago at the suggestion of the editors of the American Machinist in order to supply a convenient electrical reference book adapted to the machine shop. The viewpoint of the practical shop man has been kept in mind throughout. For the handling of circuits—both direct and alternating—for arriving at costs, for electrochemical soldering and welding, for lamps and shop lighting, and for shop motors with their applications, reference to this excellent little book will be found well worth the effort. The author is assistant professor of electrical engineering at the University of Pennsylvania.

Applied Electricity for Practical Men. By Arthur J. Rowland. Size 4½ by 8 in.; 375 pp.; 323 illustrations; cloth binding; first edition. Published by McGraw-Hill Book Company, Inc., of New York, and for sale at the Technical Book Shop, San Francisco. Price, $2.00.

This volume has been in the process of making during twenty years' experience in teaching applied electricity to practical electrical workers; to men who expect to make direct application of the principles given them in the class room to their daily work with commercial circuits and machinery. It is written wholly from the standpoint of the one who puts up and operates electric circuits and apparatus. Pure theory is avoided. The author is professor of electrical engineering at the Drexel Institute, Philadelphia. A helpful set of questions and problems are given at the end of each chapter. The clearness and simplicity of the work should commend itself to a large class of students and practical electricians.

NEWS NOTES

ILLUMINATION.

BUTTE, MONT.—Oak and Cherry streets are to have lighting posts.

SACRAMENTO, CAL.—North Sacramento has voted for the establishment of a lighting district.

SAN JOSE, CAL.—Plans for the electroliers proposed for the four corners of Market and Santa Clara streets have been taken under advisement.

POCATELLO, IDAHO—The light committee has prepared an ordinance which will provide for lights requested by the residents of the east side of town.

MALTA, MONT.—This place has voted to grant a 20-year franchise to the Standard Electrical Engineering Company for an electrical and steam heating plant.

YERINGTON, NEV.—The Yerington Electric Company has applied for a franchise for a period of 50 years to maintain an electric system in all streets in this city.

HUNTINGTON BEACH, CAL.—Bonds in the sum of $20,000 for the purpose of acquiring a municipal gas system have been sold to R. H. Moulton & Co. of Los Angeles.

LOS ANGELES, CAL.—The city electrician has been instructed by the city council to use some of the street lighting fund for the lighting of Cherokee avenue and Leland way.

ESCONDIDO, CAL.—W. E. Gird, owner of a large ranch at Bonsall, has placed an order with the Southern Electric Company of San Diego for a complete electric lighting plant.

ST. JOHNS, ARIZ.—It is probable that an electric light plant will soon be installed here. D. K. Udall of the Nebo Electric Light & Power Company and J. P. Rothlisberger & Son are behind the enterprise.

RIVERSIDE, CAL.—A committee has been appointed by the Board of Public Utilities to act on the question of awarding a contract for the construction of ornamental lighting posts on Highland place.

SACRAMENTO, CAL.—The Oak Park Business Men's Association is launching a campaign with the object of obtaining modern electroliers for the main business section of Thirty-fifth street and a portion of Sacramento avenue.

SPOKANE, WASH.—The adoption of new specifications for the city's street lighting system and the advertisement for bids for its installation have been asked by Manager E. Darrow of the Spokane Heat, Light & Power Company.

EUGENE, ORE.—The estimated cost of the extension of the city light and power wires to Santa Clara and the extension out of that village as proposed is about $6,000, according to figures submitted by C. W. Geller, superintendent of public utilities.

PALO ALTO, CAL.—The Board of Public Works has approved the report of City Engineer Byxbee in regard to the advisability of purchasing the property of the Palo Alto Gas Company, and recommended to the city council that the city proceed to acquire the property.

PORT ANGELES, WASH.—The City Council has voted to readvertise for bids for the purchase of $25,000 of public utility bonds, to retire outstanding warrants and make betterments in the lighting system. Extensions of the lighting service for streets and residence purposes was ordered on Eighth and Fifth streets at an estimated cost of $2,000.

MERCED, CAL.—The proposed installation of an electrolier system for Merced's business district will give the city one of the best and most efficient systems of street lighting in the State, according to Consulting Engineer C. T. Phillips of San Francisco who has been engaged by the city to prepare plans and specifications. The lights will be controlled from a small substation located near the city hall.

HOQUIAM, WASH.—Hoquiam voters on November 7 will pass on a bond issue of $175,000 for the purchase of the electric power distribution plant in Hoquiam. The bond project is the outgrowth of a proposal submitted to the city several weeks ago to sell the city electric current at a city service board. At present only lighting current for the greater part of the city streets is furnished by the Grays Harbor Railway & Light Company.

CENTRALIA, WASH.—Numerous concerns are installing small light and power plants for their own use, as it appears that Pe Ell will be without lights again this winter. L. A. Webb, manager of the Central Light & Manufacturing Company, has refused to reply to communications from the town council relative to furnishing lights and the company's franchise prevents any other company entering the field.

DOUGLAS, ARIZ.—The city council has received plans for a lighting system in the paved district. The plans, prepared by the city engineer, call for eight lights to a block on all north and south blocks in the paved district, four on each side of the street. The light standard adopted by the council recently will be 12 ft. high surmounted by 16-in. glass globes, containing a 400 c.p. light. On east and west blocks there will be ten lights to a block, with the same type of lights to be used.

TRANSMISSION.

EUGENE, ORE.—Announcement has been made that the Oregon Power Company will make improvements and extensions to its lines to the extent of $90,000 or $100,000.

NORTH YAKIMA, WASH.—Commissioners have granted a 25-year franchise to the Pacific Power & Light Company for pole line extension over county roads in Yakima valley.

ASTORIA, ORE.—The Pacific Power & Light Company will spend the sum of about $80,000 here in placing wires underground in pursuance of an ordinance passed by the City Council.

EUGENE, ORE.—Charles Geller, superintendent of the local lighting plant, announces that plans for extending the transmission line to Santa Clara to supply farmers on the way are being made.

HOQUIAM, WASH.—Ordinance has been introduced in the City Council calling for a special election November 7 on question of bonding in the sum of $175,000 to acquire a power distributing plant.

NORTH PLAINS, ORE.—A petition has been circulated among citizens of North Plains to ascertain how many electric lights and how much power can be used in the town, provided a satisfactory service is established here.

HOQUIAM, WASH.—An ordinance providing for the calling of a special election on Nov. 7 has been adopted by the city commission. The measure provides the city shall be bonded for $175,000 to acquire a power distributing system.

EUGENE, ORE.—Oregon Power Company plans new improvements and extensions to cost between $90,000 and $100,000 in the Coos Bay holdings of the company. The company is also planning the extension of a line into the valley of the Coquille river.

WEAVERVILLE, CAL.—Application has been made by the Western States Gas & Electric Company for a 50-year franchise for conducting electricity over roads and highways

in Trinity county. Sealed bids will be received up to January 4 by the Board of Supervisors for said franchise.

SEATTLE, WASH.—The construction of a new power plant above Marblemount on the Skagit River is indicated by the filing of three water power rights by G. M. N. Tait of Seattle, permitting him to divert 15,000 cu. ft. of water per second. Electricity will be furnished to railways, factories, etc.

PRESCOTT, ARIZ.—The Arizona Hydraulic Power Company is the title of a new company organized by Ed. Meek and his associates, who will furnish capital for the development of hydroelectric power here. The plans are to construct a diversion dam at a point 23 miles below Camp Verde and to carry the water by ditch to the site of a power plant. It will then be carried seven miles to another power producing plant. This canal will take advantage of the fall in the river and generate about 3500 h.p. and 4000 h.p. respectively.

TELEPHONE AND TELEGRAPH.

BEND, ORE.—The Pacific States Telephone Company plans extensions in Bend and vicinity at a cost of about $12,000. J. A. Halliday, Portland, is district superintendent.

SAN FRANCISCO, CAL.—The total revenue of the Pacific Telephone & Telegraph Company for its San Francisco exchanges amounted to $4,388,493 for the year beginning October 1, 1915, to September 30, 1916, according to a statement filed by the company with the board of supervisors. The Telephone Company pays the city 2 per cent of its total receipts for its franchises.

TRANSPORTATION.

REXBURG, IDAHO.—Definite steps are being taken for the establishment of an electric line from Preston to Ashton. Electric lines now run from Salt Lake to Preston, and the plan is to connect with these lines. Pocatello business men are taking the initiative in the project.

STOCKTON, CAL.—The directors of the Stockton Terminal & Eastern Railroad have signed a contract with Paul & Caldwell to pave a portion of Roosevelt street and two blocks on Union street. By entering into the contract, the railroad company has saved its franchise from forfeiture.

SAN FRANCISCO, CAL.—During August the Municipal Street Railways made a net profit of $17,890 according to a report filed with the Board of Public Works. The total receipts for the month amounted to $123 127 and the operating expenditures were $81,716. Depreciation charges amounted to $23,421.

IRRIGATION.

CHALFANT, CAL.—Annie J. Crosby has applied for 2 cu. ft. per sec. of the waters of Piute Creek for irrigation purposes. A main ditch half a hile long will carry the water to 160 acres.

ALTURAS, CAL.—Ray Baker, Fort Bidwell banker, and O. C. Gray reported to the Northern California Counties Association that the financing of the Cowhead Lake irrigation project and the watering of 70,000 acres in northeastern Modoc is assured.

LINDSAY, CAL.—Owing to a technical error the board of directors of the Lindsay-Strathmore Irrigation District have readvertised for bids for the $1,400,000 6 per cent bond issue of the district. Bids will be received at the office of the district here until October 21.

NORTH YAKIMA, WASH.—The Mt. Adams Water Power Company has applied for permission to withdraw water from Big Muddy and Hell Roaring creeks. The promoters are asking for five year rights to develop power to pump water to land near Glenwood in Klickitat county.

IMPERIAL, CAL.—Two directors of the Imperial Irrigation District have gone to Yuma to confer with officials of the Yuma Water Users' Association and Reclamation Service regarding the removal of a weir in the Colorado river, which the Yuma people declare is a menace to their project.

OXNARD, CAL.—Earl N. Loib, J. P. Burke, Charles Donlan, Jos. D. McGrath, John Lagomarsino and Jas. P. McLaughlin of Oxnard have applied for permission to appropriate 23 cubic feet per second of Owens River Valley water. The sources of appropriation are lakes in Fresno and Madera counties. It is proposed to store 16,800 acre feet of water.

LOS ANGELES, CAL.—Plans for an irrigation project that will represent an ultimate investment of $3,000,000 or more have been announced by the Victor Valley Chamber of Commerce. Water will be supplied to 35,000 acres of lands. The initial expenditure for reservoirs, dams and a bridge across Deep Creek, will be about $2,000,000. It is expected that work will begin within the next few months.

FRESNO, CAL.—The promoters of the Pine Flat reservoir, Fresno county, in conjunction with an application filed with Federal authorities for a dam site, have made application to the State Water Commission for a diversion of 1,500,000 miner's inches, or 37 500 cubic feet per second, of the waters of Kings River in Fresno county for irrigation purposes. The project calls for the construction of a dam 295 ft. high and 1100 ft. long at the top. It is expected to develop 20,000 h.p. for use in pumping water through the irrigating systems.

SALEM, ORE.—Residents on the Ochoco Irrigation project in Crook county will vote on the question of bonding the project for $1,000,000 to secure funds to carry out contemplated improvements, it became assured recently when the office of State Engineer Lewis approved in its general features the report of R. W. Rea, project engineer. Notice of the report's approval was sent to the directors of the project today. The project as approved by Engineer Lewis embraces 20,000 acres of land in Crook county. It is proposed to issue bonds on the basis of $50 an acre valuation for the project.

SACRAMENTO, CAL.—Wm. H. Earl, for the Long Valley Irrigation District, has made application to the state water commission for permission to appropriate 550 cubic feet per second, or 1,000,000 acre feet, of the waters of Long Valley Creek, tributary to Honey Lake, in Lassen county, for the purpose of irrigating 34,345 acres in the district. The intake canal, as proposed, is ten miles long. The diversion dam is set forth as 100 ft. high, 365 ft. on top and 100 ft. on bottom, of concrete and masonry, whose estimated cost is $1,000,000. The present application is really the perfection of a previous one filed to hold the priority on the water while the irrigation district was being formed and complete maps and data compiled.

LOS ANGELES, CAL.—The Llano del Rio Company of Nevada, with headquarters at Llano, Los Angeles county, has applied to the state water commission for permission to appropriate for agricultural purposes 3000 cubic feet per second of the waters of Big Rock Creek in Los Angeles county. The pipe lines to convey the water to the lands will be one and three-quarters miles long. The project will be known as the Big Rock Creek irrigation project. Included in the works is a dam 110 ft. high, 900 ft. long on top and 200 on the bottom, with a width of 50 ft. on top, impounding 5600-acre feet, the reservoir flooding 142 acres. The estimated cost of the dam is $90,000 and the pipe lines $40,000. It is estimated that it will take five years to complete bringing 4710 acres under irrigation.

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	List.	Sell.
100 Amp., T. P. S. T.	7.10	6.25
200 Amp., T. P. S. T.	10.98	11.00
400 Amp., T. P. S. T.	24.30	24.50
600 Amp., T. P. S. T.	33.46	33.50
30 Amp., F. P. S. T.	3.20	3.70
60 Amp., F. P. S. T.	4.72	5.80
100 Amp., F. P. S. T.	9.48	9.50
Knife Switches—250 V. Unfused		
30 Amp., S. P. S. T.	.80	.80
60 Amp., S. P. S. T.	1.20	1.20
100 Amp., S. P. S. T.	2.25	2.10
30 Amp., D. P. S. T.	1.20	1.20
60 Amp., D. P. S. T.	1.78	1.70
100 Amp., D. P. S. T.	3.38	3.20
200 Amp., D. P. S. T.	5.20	5.20
400 Amp., D. P. S. T.	12.20	12.20
600 Amp., D. P. S. T.	17.30	17.50
30 Amp., T. P. S. T.	1.80	1.80
60 Amp., T. P. S. T.	2.68	2.70
100 Amp., T. P. S. T.	5.08	4.75
200 Amp., T. P. S. T.	7.80	7.80
400 Amp., T. P. S. T.	18.30	18.50
600 Amp., T. P. S. T.	25.96	26.00
30 Amp., F. P. S. T.	2.40	2.70
100 Amp., F. P. S. T.	3.56	3.80
60 Amp., F. P. S. T.	6.76	7.00
200 Amp., F. P. S. T.	10.40	10.50
400 Amp., F. P. S. T.	25.94	26.00
Knife Switches—600 Volt. Unfused, Not Quick Break.		
30 Amp., D. P. S. T.	1.34	1.30
60 Amp., D. P. S. T.	1.60	1.65
100 Amp., D. P. S. T.	3.16	3.30
30 Amp., T. P. S. T.	2.10	2.10
60 Amp., T. P. S. T.	2.50	2.50
100 Amp., T. P. S. T.	4.90	4.90
Fused.		
30 Amp., D. P. S. T.	1.96	1.95
60 Amp., D. P. S. T.	2.36	2.35
100 Amp., D. P. S. T.	4.60	4.65
30 Amp., T. P. S. T.	3.14	3.15
60 Amp., T. P. S. T.	3.78	4.55
100 Amp., T. P. S. T.	7.36	8.90
Combination—250 Volts.		
D. P. Entrance, 25 Amp., Bottom Moulding	.05	.10
D. P. Entrance, 25 Amp., Top Connections	.90	.90
2 to 2 Wire S. B. Mains, Vertical, 15 A.	1.00	1.00
2 to 2 Wire S. B. Mains, Horizontal, 15A.	1.00	1.00
2 to 2 Wire D. B. Mains, Vertical 15 A.	2.00	2.00
2 to 2 Wire D. B. Mains, Horizontal, 15 A.	2.00	2.00
3 to 2 Wire D. B. Mains, Vertical, 15 A.	2.10	2.10
3 to 2 Wire D. B. Mains, Horizontal, 15 A.	2.10	2.10

The correctness of these suggested selling prices is not guaranteed by publisher. Suggestions for corrections are invited.

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Number 25

	List.	Sell.
Automatic Door.		
Light "ON" with door open	2.25	2.25
Light "OFF" with door open	2.25	2.25
Conduit Box, with Clamp for Door Switch	.40	.40
Time.		
Reliance	....	24.00
General Electric	....	30.00
Hart	....	36.00
Campbell	....	30.00
Anderson	....	42.00
Hartford	....	....
Struck Up Plates for Push Switch.		
1 Gang, 040 Metal	.25	.25
2 Gang, 040 Metal	.45	.45
3 Gang, 040 Metal	.65	.65
4 Gang, 040 Metal	1.40	1.40
5 Gang, 040 Metal	1.75	1.75
6 Gang, 040 Metal	2.10	2.10
7 Gang, 040 Metal	2.45	2.45
8 Gang, 040 Metal	2.80	2.80
Standard Plates for Rotary Flush Switches.		
1 Gang	.53	.55
2 Gang	1.20	1.20
3 Gang	1.80	1.80
4 Gang	2.40	2.40
5 Gang	3.50	3.50
6 Gang	4.20	4.20
7 Gang	4.90	4.90
8 Gang	5.60	5.60
1 Gang, 040 Metal	.40	.40
Round Corners and Edges.		
1 Gang	.27	.27
2 Gang	.54	.54
3 Gang	.81	.81
Tandem in One Vertical Row.		
2 Gang	1.20	1.20
3 Gang	1.80	1.80
4 Gang	2.40	2.40
Knife Switches—250v.—Fused—Type A.		
30 Amp., S. P. S. T.	1.08	1.10
60 Amp., S. P. S. T.	1.58	1.60
100 Amp., S. P. S. T.	3.16	2.80
30 Amp., D. P. S. T.	1.60	1.70
60 Amp., D. P. S. T.	2.36	2.50
100 Amp., D. P. S. T.	4.41	4.20
200 Amp., D. P. S T.	7.32	7.30
400 Amp., D. P. S. T.	16.20	16.50
600 Amp., D. P. S. T.	22.30	22.50
30 Amp., T. P. S. T.	2.40	2.50
60 Amp., T. P. S. T.	3.54	3.50

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